



Pneumopericardium and Deep Sulcus Sign After Blunt Chest Trauma

Künt Göğüs Travması Sonrası Pnömotoraks ve Derin Sulkus Bulgusu

Pneumopericardium and Deep Sulcus Sign

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Özet

Pnömotoraks, perikard yaprakları arasında hava bulunması olarak tanımlanır. Genellikle kendini sınırlar, tansiyon pnömotoraks oluşturduğu durumda ise hızlı sıvı resüsitasyonu ve hemodinamik kontrolü takiben, perikardiyal pencere açılması veya drenaj gerektirir. Yüksekten düşme sonrası acil serviste değerlendirilen 49 yaşındaki erkek hastada, supin pozisyonda çekilen akciğer grafisinde; derin sulkus bulgusu, ciltaltı amfizemi, çoklu kot fraktürü, bilgisayarlı tomografide; perikardiyal serbest hava, sağ pnömotoraks ve ciltaltı amfizemi tespit edildi. Hasta sağ tüp torakostomi uygulanarak yoğun bakım takibine alındı. Kardiyak enzim takipleri yapıldı. Takiplerinde tansiyon pnömotoraks gelişmedi. Cilt altı amfizemi geriledi. Travma sonrası onuncu gün çekilen tomografisinde pnömotoraks alanının tamamen gerilediği görüldü.

Anahtar Kelimeler

Pnömotoraks; Pnömotoraks; Akciğer Grafisi

Abstract

Pneumopericardium is defined as air between the leaves of the pericardium, which is usually self-limited. In tension pneumopericardium, however, rapid fluid resuscitation and haemodynamic monitoring followed by pericardial fenestration and drainage should be performed. A 49-year-old male falling from height was brought to the emergency room. On chest X-ray in supine position, a deep sulcus sign and subcutaneous emphysema with multiple rib fractures were detected. At computerized tomography, pericardial free air, right pneumothorax and subcutaneous emphysema were detected. A tube thoracostomy was applied to the patient. During follow-up with cardiac enzymes in the intensive care unit, no tension pneumopericardium developed, and subcutaneous emphysema regressed. A control computerized tomography scan showed a complete regression in the pneumopericardium on the tenth day.

Keywords

Pneumopericardium; Pneumothorax; Chest X-Ray

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Introduction

Pneumopericardium is defined as presence of air between pericardial leaves. While it occurs occasionally in adults after severe blunt thoracic trauma, it also can be seen at circumstances those lead to pneumothorax, pneumoperitoneum or pneumomediastinum. Pneumopericardium is usually a self-limited condition with no specific therapy, but may progress to tension pneumopericardium. Tension pneumopericardium is a life-threatening cardiac tamponade which requires an immediate pericardial aspiration and subsequent pericardial drainage via a pericardial window or emergent open subxyphoid approach to the pericardium [1]. The deep sulcus sign is the lucency of the costophrenic angle extending toward the hypochondrium. This finding is a significant clue for pneumothorax on chest radiograph obtained in supine position[2]. Here, we report a case with pneumopericardium after blunt chest trauma due to fall from height, with a deep sulcus sign at chest x-ray (CXR) in supine position taken at initial assessment.

Case Report

A 49-year-old male patient falling from height was brought to the emergency room. On physical examination, his Glasgow coma scale was 15, the blood pressure was 110/70 mmHg, the heart rate was 88/minute, and the respiratory rate was 22/minute. There was a 15x15 cm flail-chest area at the right posterolateral chest wall, extending to the right neck region with a subcutaneous emphysema on examination. Tenderness was observed on the bilateral posterior thoracic wall. Breath sounds were decreased on the right. At the CXR in supine position, a pneumothorax was suspected at the right side, a deep sulcus sign on the right sinus with subcutaneous emphysema, and fractures of the right 3, 4, 5, 6, 7, 8, 9, 10th ribs, and the left 9, 10th ribs (Figure 1). At computerized tomography (CT) scan, pericardial free air, right pneumothorax and subcutaneous emphysema were detected (Figure 2). His hemoglobin value was 14.0 g/L, troponin I (TI) 0.463 ng/mL. The blood biochemistry were within normal limits. The patient was taken to the intensive care unit (ICU) by applying right tube thoracostomy, and followed closely. TI values were 0.397 ng/mL after 6 hours, and 0.078 ng/mL after 24 hours. His subcutaneous emphysema was regressed. At

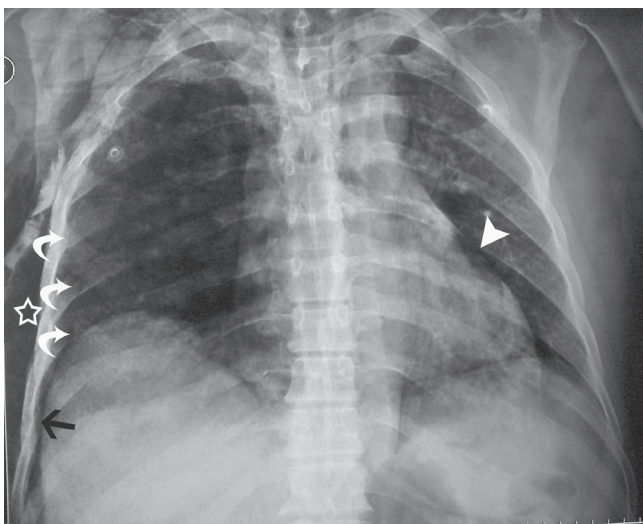


Figure 1. Supine position X-ray graph; deep sulcus sign (arrow), rib fractures (curved arrows), subcutaneous emphysema (star), pneumopericardium (arrowhead)



Figure 2. Computerized tomography image; pericardial free air (arrowhead)

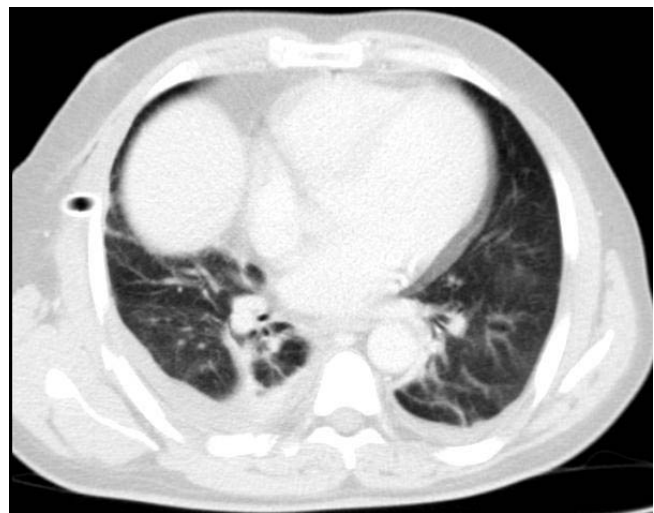


Figure 3. Pericardial air totally regressed at 10th day

the CT scan of the tenth day after trauma, pericardial air was found to be completely resorbed (Figure 3). His clinical follow-up was uneventful and the patient was discharged well on the thirteenth day.

Discussion

Pneumopericardium occurs most commonly secondary to mechanical ventilation. Also, it can be seen after invasive procedures such as laparoscopy, endoscopy, colonoscopy or secondary to chest trauma (penetrating > blunt). Pneumopericardium after blunt chest trauma usually occurs via one of the three mechanisms: 1- The penetration of air to pericardium from the ruptured alveoli, throughout the pulmonary venous perivascular ducts. 2- The combination of pleuropericardial tear and pneumothorax. 3- The direct connection of the tracheobronchial way and pericard [3].

Even if pneumopericardium may be asymptomatic initially, it may rapidly progress to life-threatening tension pneumopericardium. Pneumopericardium symptoms are chest pain, dyspnea, palpitations, heart sounds coming deeply and murmur. In addition, the electrocardiogram changes, such as ST elevation/depression, could be seen. None of these findings, however, are specific [4].

For diagnosis, CXR and CT could be used. The “continuous left

hemidiaphragm sign” can be observed at CXR that indicates the presence of air within pericardium, which makes normally invisible parts of the central diaphragm visible in continuation with both hemidiaphragms [4]. At CXR, the characteristic sign is the presence of air around the cardiac silhouette. “Small heart sign” should be warning for cardiac tamponade and tension pneumopericardium [5]. The CT scan confirms the diagnosis, and it should include abdomen and thorax for detection of possible accompanying injuries. Echocardiography is not used for routine diagnosis of pneumopericardium, because the passage of the ultrasound waves throughout the air is weak [1]. In our case, at CXR, an air image was found around the cardiac silhouette. In addition, an indirect evidence of pneumothorax, “deep sulcus sign” was detected at CXR in supine position. The diagnosis of pneumopericardium and pneumothorax was confirmed with CT. Besides, a bilateral lung contusion, right pneumothorax and multiple rib fractures were detected as associated pathology in our case.

Usually self-limiting pneumopericardium may alternate to tension pneumopericardium which would require pericardial drainage through the opening of an emergent pericardial window or pericardial suctioning. For this reason, patient should be followed in ICU with cardiac and blood pressure monitoring [1]. Acute hemodynamic deterioration in a patient with pneumopericardium should prompt further investigation, and cardiac tamponade should be actively ruled out. In tension pneumopericardium, rapid fluid resuscitation and emergent pericardiocentesis with echocardiographic guidance and haemodynamic monitoring, followed by pericardial fenestration and pericardial drainage, should be performed [6]. With stable haemodynamic conditions and absent tamponade, the underlying condition should be treated and the patient should be monitored closely [4]. In our case, mechanical ventilation was not required. After tube thoracostomy, pneumopericardium was declined. Pneumopericardium was fully regressed at CT obtained at the tenth day.

Conclusion

Pneumopericardium should be kept in mind in a multiple-trauma patient because of the accompanying injuries to the fore. It is a serious condition having the potential to progress life-threatening tension pneumopericardium and tamponade. Therefore, especially at chest trauma cases, tips of pneumopericardium at CXR must be known, and the diagnosis must be confirmed by CT. Once a pneumopericardium detected, the patient should be taken under close hemodynamic follow-up for the risk of tension pneumothorax and cardiac tamponade. A rapid pericardial decompression, when necessary, should be provided with appropriate techniques.

Competing interests

The authors declare that they have no competing interests.

References

1. Ladurner R, Qvick LM, Hohenbleicher F, Hallfeldt KK, Mutschler W, Mutschler. Pneumopericardium in blunt chest trauma after high-speed motor vehicle accidents. *Am J Emerg Med* 2005;23:83-6.
2. Kong A. The deep sulcus sign. *Radiology* 2003;228:415-6.
3. Gould JC, Schurr MA. Tension Pneumopericardium After Blunt Chest Trauma. *Ann Thorac Surg* 2001;72:1728-30.
4. Brander L, Ramsay D, Dreier D, Peter M, Graeni R. Continuous left hemodia-

phragm sign revisited: a case of spontaneous pneumopericardium and literature review. *Heart* 2002;88:e5.

5. Mirvis SE, Indeck M, Schorr RM, Diaconis JE. Posttraumatic tension pneumopericardium: the “small heart” sign. *Radiology* 1986;158(3):663-9.

6. Capizzi PJ, Martin M, Bannon MP. Tension pneumopericardium following blunt injury. *J Trauma* 1995;39:775-80.

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